CLAIMS

What is claimed is:

1. An ion implantation system, comprising:

an ion source operable to produce an extracted ion beam;

a dispersion system located near the ion source to receive the extracted ion beam; and

a mass analyzer having an entrance and an exit, the mass analyzer receiving either the extracted ion beam or a dispersed ion beam from the dispersion system at the entrance and directing ions of a desired mass range to the exit;

wherein the dispersion system is operable to selectively pass the extracted ion beam from the ion source to the mass analyzer or to direct a dispersed ion beam toward the mass analyzer, the dispersed ion beam having fewer ions of an undesired mass range than the extracted ion beam.

2. The ion implantation system of claim 1, wherein the dispersion system is operable to selectively pass the extracted ion beam from the ion source toward the mass analyzer along a first path in a first mode or to direct the dispersed ion beam toward the mass analyzer along the first path in a second mode.

3. The ion implantation system of claim 2, wherein the dispersion system is operable to direct the extracted ion beam away from the first path and to redirect ions of the desired mass range back onto the first path to create the dispersed ion beam in the second mode.

4. The ion implantation system of claim 3, wherein the dispersion system comprises:

a first magnetic field generating device providing a first magnetic field along the first path that directs ions from the extracted beam away from the first path in the second mode;

a second magnetic field generating device providing a second magnetic field that directs ions from the extracted beam back toward the first path in the second mode; and

a resolving structure that intercepts at least some ions of the undesired mass range and passes at least some ions of the desired mass range to the mass analyzer in the second mode.

5. The ion implantation system of claim 4, wherein the resolving structure is movable between a first position in the first mode in which the resolving structure does not obstruct passage of the extracted ion beam along the first path, and a second position in the second mode in which the resolving structure at least partially obstructs passage of the extracted ion beam along the first path, intercepts at least some ions of the undesired mass range and passes at least some ions of the desired mass range to the mass analyzer in the second mode.

6. The ion implantation system of claim 4, wherein the dispersion system comprises a third magnetic field generating device providing a third magnetic field that directs ions of the desired mass range toward the mass analyzer along the first path in the second mode.

7. The ion implantation system of claim 3, wherein the dispersion system comprises:

a resolving structure comprising at least one blocking surface and an aperture; and

a plurality of dipole magnets operable to provide a plurality of magnetic fields in the dispersion system in the second mode, wherein the plurality of

magnetic fields direct at least some ions of the undesired mass range from the extracted ion beam to the at least one blocking surface of the resolving structure and direct at least some ions of the desired mass range through the aperture of the resolving structure to form the dispersed ion beam.

8. The ion implantation system of claim 3, wherein the dispersion system comprises:

a resolving structure comprising at least one blocking surface and an aperture; and

a first magnetic field generating device providing a first dipole magnetic field of a first orientation near the ion source, wherein the first dipole magnetic field directs ions from the extracted beam away from the first path in a first direction in the second mode;

a second magnetic field generating device providing a second dipole magnetic field of a second orientation, the second orientation being different than the first orientation, wherein the second dipole magnetic field directs ions in a second direction away from the first direction toward the resolving structure, wherein the second dipole magnetic field directs at least some ions of the undesired mass range to the at least one blocking surface of the resolving structure, and wherein the second dipole magnetic field directs at least some ions of the desired mass range through the aperture of the resolving structure to form the dispersed ion beam; and

a third magnetic field generating device providing a third dipole magnetic field of a third orientation, the third orientation being different than the second orientation, wherein the third dipole magnetic field directs ions of the dispersed ion beam toward the mass analyzer along the first path.

9. The ion implantation system of claim 8, wherein the first, second, and third magnetic field generating devices are dipole electromagnets.

10. The ion implantation system of claim 1, wherein the dispersion system is operable to selectively pass the extracted ion beam from the ion source toward the mass analyzer along a first path in a first mode or to direct the dispersed ion beam toward the mass analyzer along a second path in a second mode.

11. The ion implantation system of claim 10, wherein the dispersion system is operable to direct the extracted ion beam away from the first path and to redirect ions of the desired mass range toward the mass analyzer along the second path in the second mode.

12. The ion implantation system of claim 11, wherein the dispersion system comprises:

a first magnetic field generating device providing a first magnetic field along the first path that directs ions from the extracted beam away from the first path in the second mode;

a second magnetic field generating device providing a second magnetic field that directs ions from the extracted beam along the second path in the second mode; and

a resolving structure that intercepts at least some ions of the undesired mass range and passes at least some ions of the desired mass range to the mass analyzer along the second path in the second mode.

13. The ion implantation system of claim 11, wherein the dispersion system comprises:

a resolving structure comprising at least one blocking surface and an aperture; and

a plurality of dipole magnets operable to provide a plurality of magnetic fields in the dispersion system in the second mode, wherein the plurality of magnetic fields direct at least some ions of the undesired mass range from the

extracted ion beam to the at least one blocking surface of the resolving structure and direct at least some ions of the desired mass range through the aperture of the resolving structure and toward the mass analyzer to form the dispersed ion beam along the second path.

14. The ion implantation system of claim 11, wherein the dispersion system comprises:

a resolving structure comprising at least one blocking surface and an aperture; and

a first magnetic field generating device providing a first dipole magnetic field of a first orientation near the ion source, wherein the first dipole magnetic field directs ions from the extracted beam away from the first path in a first direction in the second mode;

a second magnetic field generating device providing a second dipole magnetic field of a second orientation, the second orientation being different than the first orientation, wherein the second dipole magnetic field directs ions in a second direction toward the resolving structure, wherein the second dipole magnetic field directs at least some ions of the undesired mass range to the at least one blocking surface of the resolving structure, wherein the second dipole magnetic field directs at least some ions of the desired mass range through the aperture of the resolving structure to form the dispersed ion beam, and wherein the second dipole magnetic field directs ions of the dispersed ion beam toward the mass analyzer along the second path.

15. The ion implantation system of claim 1, wherein the dispersion system derives the dispersed ion beam from the extracted ion beam.

16. The ion implantation system of claim 15, wherein the dispersion system removes at least some ions of the undesired mass range from the extracted ion beam to derive the dispersed ion beam.

17. A beamline assembly for transporting ions from an ion source to an end station in an ion implantation system, the beamline assembly comprising:

a dispersion system that receives an extracted ion beam from an ion source; and

a mass analyzer that receives either the extracted ion beam or a dispersed ion beam from the dispersion system and directs ions of a desired mass range toward an end station;

wherein the dispersion system is operable to selectively pass the extracted ion beam from the ion source to the mass analyzer or to direct a dispersed ion beam toward the mass analyzer, the dispersed ion beam having fewer ions of an undesired mass range than the extracted ion beam.

18. The beamline assembly of claim 17, wherein the dispersion system is operable to selectively pass the extracted ion beam from the ion source toward the mass analyzer along a first path in a first mode or to direct the dispersed ion beam toward the mass analyzer along the first path in a second mode.

19. The beamline assembly of claim 17, wherein the dispersion system is operable to selectively pass the extracted ion beam from the ion source toward the mass analyzer along a first path in a first mode or to direct the dispersed ion beam toward the mass analyzer along a second path in a second mode.

20. The beamline assembly of claim 17, wherein the dispersion system derives the dispersed ion beam from the extracted ion beam.

21. The beamline assembly of claim 20, wherein the dispersion system removes at least some ions of the undesired mass range from the extracted ion beam to derive the dispersed ion beam.

22. A method of generating a mass analyzed ion beam in an ion implantation system, the method comprising:

providing an extracted ion beam having ions of a desired mass range and ions of an undesired mass range;

selectively passing the extracted ion beam to the mass analyzer or deriving a dispersed ion beam from the extracted ion beam and providing the dispersed ion beam to a mass analyzer, wherein the dispersed ion beam has fewer ions of the undesired mass range than the extracted ion beam; and

removing at least some ions of the undesired mass range from the dispersed ion beam or the extracted ion beam using the mass analyzer to generate a mass analyzed ion beam.

23. The method of claim 22, wherein deriving the dispersed ion beam from the extracted ion beam comprises removing at least some ions of the undesired mass range from the extracted ion beam.

24. The method of claim 23, wherein removing at least some ions of the undesired mass range from the extracted ion beam comprises:

providing a first dipole magnetic field of a first orientation that deflects ions of the extracted ion beam;

providing a second dipole magnetic field of a second orientation that directs at least some ions of the undesired mass range to a blocking surface of a resolving structure, and directs at least some ions of the desired mass range through an aperture of the resolving structure to form the dispersed ion beam.

25. The method of claim 24, wherein providing the dispersed ion beam to a mass analyzer comprises providing a third dipole magnetic field that directs the dispersed ion beam toward the mass analyzer along an original path of the extracted ion beam.